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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/942,823	08/30/2001	James M. Leas	FIS920010082US1	9997

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EXAMINER	
PHAN, HANH	

ART UNIT	PAPER NUMBER
2633	

DATE MAILED: 01/24/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/942,823	LEAS, JAMES M.	
	Examiner	Art Unit	
	Hanh Phan	2633	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *30 August 2001*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-42* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-42* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *01/19/2005*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

1. In claim 22, the phrase "said germanium containing layer has a thickness ranging from about 0.1um to about 1um" should be changed to -- said germanium containing layer has a thickness ranging from about 0.1μm to about 1μm --.

2. In claim 35, the phrase "the energy of the optical signal is in the range from 0.66um to 1.12um" should be changed to -- the energy of the optical signal is in the range from 0.66eV to 1.12eV --.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claims 1-29 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

-Claim 1 recites the limitation "**said portion** is absorbed by said first semiconductor material" in lines 13 and 14. There is insufficient antecedent basis for this limitation in the claim.

-Claim 18 recites the limitation "**said portion** is absorbed by said first semiconductor material" in lines 13 and 14. There is insufficient antecedent basis for this limitation in the claim.

-Claim 23 recites the limitation **"said integrated circuit chip"** in line 2. There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. Claims 1-42 are rejected under 35 U.S.C. 103(a) as being unpatentable over Rao (US Patent No. 5,889,903 cited by applicant) in view of Shanley (US Patent No. 6,477,285).

Regarding claims 1, 18 and 30, referring to Figures 3, 5 and 6, Rao discloses a method for providing an optical signal (i.e., laser pulse 505, Fig. 5) to a semiconductor (i.e., a semiconductor 513, Fig. 5), comprising the steps of:

providing a semiconductor substrate (i.e., semiconductor substrate 513, Fig. 5) having a first surface (i.e., front side, Fig. 5) and a second surface (i.e., back side 511, Fig. 5) opposite the first surface, a second semiconductor of a second semiconducting material (i.e., semiconductor silicon 513, Fig. 5);

forming a device (i.e., P-N junction 515, Fig. 5) in the second semiconductor layer to collect carriers generated by the optical signal; and

directing the optical signal (laser pulse 505, Fig. 5) at the second surface (back side 511, Fig. 5) wherein the optical signal passes through the second semiconductor (513) and is absorbed by the second semiconductor (col. 5, lines 49-67 and col. 6, lines 1-42).

Rao differs from claims 1, 18 and 30 in that he fails to teach a first semiconductor layer of a first semiconducting material adjacent the first surface, the first semiconductor layer on a second semiconductor of a second semiconducting material, the first semiconducting material having a higher absorption coefficient than the second semiconducting material when both the first semiconducting material and the second semiconducting material are undoped and forming a device in the first semiconductor layer to collect carriers generated by the optical signal. However, Shanley in US Patent No. 6,477,285 teaches a first semiconductor layer of a first semiconducting material adjacent the first surface, the first semiconductor layer on a second semiconductor of a second semiconducting material, the first semiconducting material having a higher absorption coefficient than the second semiconducting material when both the first semiconducting material and the second semiconducting material are undoped and forming a device in the first semiconductor layer to collect carriers generated by the optical signal (Figs. 1-3, 16, 17, 23 and 25, col. 19, lines 2-20, col. 23, lines 20-43 and col. 24, lines 15-64). Therefore, it would have been obvious to one having skill in the art at the time the invention was made to incorporate the first semiconductor layer of a first semiconducting material adjacent the first surface, the first semiconductor layer on a second semiconductor of a second semiconducting material, the first semiconducting material having a higher absorption coefficient than the second semiconducting material

when both the first semiconducting material and the second semiconducting material are undoped and forming a device in the first semiconductor layer to collect carriers generated by the optical signal as taught by Shanley in the system of Rao. One of ordinary skill in the art would have been motivated to do this since Shanley suggests in column 19, lines 2-20, col. 23, lines 20-43 and col. 24, lines 15-64 that using such the first semiconductor layer of a first semiconducting material adjacent the first surface, the first semiconductor layer on a second semiconductor of a second semiconducting material, the first semiconducting material having a higher absorption coefficient than the second semiconducting material when both the first semiconducting material and the second semiconducting material are undoped and forming a device in the first semiconductor layer to collect carriers generated by the optical signal have advantage of allowing reducing the clock skew and increasing the signal to noise ration.

Regarding claim 2, the combination of Rao and Shanley teaches wherein the optical signal comprises an optical clocking signal (col. 5 of Rao, lines 49-53 and Fig. 25 of Shanley).

Regarding claim 3, the combination of Rao and Shanley teaches wherein the optical signal comprises an optical data signal (Fig. 5 of Rao and Fig. 25 of Shanley).

Regarding claim 4, the combination of Rao and Shanley teaches wherein the optical data signal comprises digital data for data processing, text, graphic, voice, or video (Fig. 25 of Shanley, col. 23, lines 20-43).

Regarding claim 5, the combination of Rao and Shanley teaches wherein the optical signal is absorbed in the first semiconductor layer for generating an electrical signal (Figs. 1-3, 16, 17 and 25 of Shanley).

Regarding claims 6, 19 and 31, the combination of Rao and Shanley teaches wherein the first semiconducting material comprises germanium and the second semiconducting material comprises silicon (Fig. 16 of Shanley, col. 19, lines 2-20).

Regarding claims 7, 20 and 32, the combination of Rao and Shanley teaches wherein the germanium containing material comprises SiGe (Fig. 16 of Shanley, col. 19, lines 2-7).

Regarding claim 8, the combination of Rao and Shanley teaches the step of depositing a layer containing germanium, and the step of forming the device in or on the layer (Figs. 16 and 17 of Shanley).

Regarding claims 9, 21 and 33, the combination of Rao and Shanley teaches the germanium concentration of the germanium containing layer is graded (Figs. 16 and 17 of Shanley).

Regarding claims 10, 28 and 41, the combination of Rao and Shanley teaches the first semiconducting material comprises a lower bandgap than the second semiconducting material (Figs. 16 and 17 of Shanley).

Regarding claims 11, 29 and 42, the combination of Rao and Shanley teaches wherein the first semiconducting material comprises an amorphous material or a direct bandgap material and the second semiconducting material comprises a crystalline material or an indirect bandgap material (Fig. 16 of Shanley, col. 18, lines 35-59).

Regarding claims 12 and 35, the combination of Rao and Shanley teaches wherein the energy of the optical signal is in the range from 0.66eV to 1.12eV (col. 5 of Rao, lines 5-8).

Regarding claims 13, 24 and 36, the combination of Rao and Shanley teaches wherein the device is selected from a P-N diode, a PIN diode, a Schottky diode and a transistor (col. 24 of Shanley, lines 15-53).

Regarding claims 14, 23, 25-27, 34 and 37, the combination of Rao and Shanley teaches wherein the substrate is an integrated circuit chip and wherein a plurality of the devices are distributed around the integrated circuit chip for simultaneously receiving the optical signal (Fig. 5 of Rao and Fig. 25 of Shanley).

Regarding claims 15 and 38, the combination of Rao and Shanley teaches wherein the optical signal comprises an optical clocking signal, and wherein the integrated circuit chip further comprises devices or circuits that use the clocking signal when it is converted to an electrical clocking signal (Figs. 4 and 5 of Rao and Fig. 25 of Shanley).

Regarding claims 16, 17, 39 and 40, the combination of Rao and Shanley teaches further comprising a plurality of integrated circuit chips, wherein each of the integrated circuit chips comprise at least one of the devices and wherein each of the integrated circuit chips are configured to receive the optical signal (Fig. 25 of Shanley).

Regarding claim 22, it would have been obvious to obtain the germanium containing layer has a thickness ranging from about 0.1μm to about 1μm in order to allow to reducing the clock skew and increasing the signal to noise ratio.

Conclusion

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Hanh Phan whose telephone number is (571)272-3035.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jason Chan, can be reached on (571)272-3022. The fax phone number for the organization where this application or proceeding is assigned is (703)872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703)305-4700.

HANH PHAN
PRIMARY EXAMINER